more than one set of output power values is calculated,

a5

a utility function is formed in order to select one set of output power values, and

the set of output power values is selected, which minimizes the value of said utility function.

REMARKS

1. A marked-up version of the title paragraph and claims is attached hereto.

2. A proposed drawing correction is enclosed.

The Abstract has been amended as requested.

A new more descriptive title has been supplied.

Claim 16 has been amended as requested and is therefore no longer objectionable.

Claim 1 has been amended to eliminate the insufficient antecedent basis problem. It is therefore respectively submitted that Claims 1-15 now conform to 35 U.S.C. 112 second paragraph.

Claim 19 and 20 are claims 11 and 14, respectively, in independent form and are therefore allowable.

In Persson the Examiner refers to col. 4, lines 48-62, and to col. 5, line 51, through col. 8, line 39. On col. 6, line 10, Persson refers to non-orthogonal channels, but has a disclaimer on col. 10, lines 26-31, stating that a person skilled in the

art may apply the derivation to orthogonal channels, too. Such a statement may be quite ambitious, since the applicant says that the question about the orthogonality and non-orthogonality is important for any radio system, as the computational complexity is different. The inverse matrix of the orthogonal channels is equal to the transpose matrix. However, in the radio environment we have to deal with channel dispersion and time variation of the channels, which even in CDMA will cause non-orthogonality at the receiver. The known receiver techniques cope well with this. In the CDMA calculations for the radio cell behavior in the downlink, typically an orthogonality factor is present. However, determination of the value of the orthogonality factor is not simple at all. This factor varies in time, depends on the receiver location in the cell, and depends on the radio geometry of the environment. Typically, a fixed value for a given cell type is used in the CDMA signal-to-interference calculations.

It is respectfully submitted that meaning of fast fading for power control and intereference is somewhat different from the meaning of fast power control for the receiver algorithms, e.g., detection and estimation techniques in Pelin.

The importance of fast fading (-even the power controlled fast fading profile-) is significant in the CDMA systems both in the downlink and uplink, and cannot be omitted. The closed loop power control is a simple and known technique to combat this, whereas the outer loop power control is the quality control mechanism to set received power targets for the received signal-to-interference distribution to achieve the required bearer quality as the Bit Error Rate. The open loop power control is used in the special cases of initial access. All this power

behavior of single links and propagation paths with fast fading profile will impact on the power behavior of the cells.

Explicit reference to fast fading was not found in Persson, as the examiner states. Therefore, Persson does not describe the invention. However in the Office Action there is reference to Pelin to fix that, especially to col. 1, lines 13-21. In reality, those lines just state that different kinds of fading may exist, including a note to fast fading as such, but nothing more; any analysis or relation to the claimed invention was not found.

The importance of the current invention is emphasized in the following situations, which are very typical and critical for power settings and are not well mentioned in Persson like traffic fluctuation and instantaneous/continuous (frame-by-frame) changes in bit-rates - no only "mode" changes. Persson is well defined in the situations as during the initial access; mobile station entering the cell; mobile station leaving the cell; mobile station establishing/releasing macro diversity legs; mobile station switching passive/active state (this state transition does not cover packet idle times nor DTX - this covers idle/active mode state transitions only) and mobile station switching between high data-rate/low data-rate modes.

The current invention may also apply to the power setting for FACH, which typically uses a fixed power for cell coverage. However, if the amount of traffic in the cell changes, there may be need to calculate FACH power change as in the current application to maintain the coverage. Similarly, when the amount of traffic or interference clearly decreases, the FACH power could be re-calculated and lowered to reduce interference to the adjacent cells and still maintaining the coverage as

planned. Such fluctuations are clearly described by the equations in the current application and the power/interference matrix on the contrary to Persson, which mainly states bit rate changes and special occasions.

In the current application the importance of history is, in particular, stated and is present in the matrix equations, whereas Persson considers momentary values. The history information is very useful for example in the compressed mode, DTX and determined bit rate changes as the compressed mode ratio, DTC-ratio and bit rate ratio correspondingly define pretty exactly the needed power changes based on the history (previous frame).

The current application emphasizes the role of fast fading, which is very relevant as it is one of the fundamentals causing interference conditions and their fluctuations to the cells, as fast power control is applied in CDMA.

The current application essentially includes the formulation of the utility function, which forms basis for any optimization or power setting decision. Such a utility function is not shown in Persson or is different from the control function of equation (13).

The current application introduces that there are different requirements for different bearers as different service categories, e.g., in the sense of delay and throughput not only as bit rate and power as given in Persson.

In Pelin none of the represented methods are descriptive or limiting for the current application. Pelin very well describes the prior art needed in the receiver techniques for the current invention. However, such means of Pelin do not solve the

problems covered in the current invention. Any sychronization, detection, sampling, estimation (amplitude, phase, frequency, etc.), equalization methods, ISL-cancellation and antenna arrays are all symbol level operations. Power control will not be applied on the symbol level, but will be applied as control means for longer periods of time (e.g. control action per one slot or one frame or even much longer time) consisting of many tens, hundred or even tends of thousands of symbols. Power control means in the current invention can be ultimately targeted to combat even longer term variations caused by traffic fluctuations and discontinuities.

Thus even if Persson and Pelin are combined, the result is not the present invention since the first fading limitation recited in claims 1 and 16 is missing.

It is therefore submitted that the rejection of claims 1-9, 13 and 16 under 35 U.S.C. 103 on this combination of references should be withdrawn.

Similarly, Reed and Haartsen fail to show the fast fading concept. Thus the rejection of claims 10 and 15 should be withdrawn.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

A check in the amount of $278.00 is enclosed for a 1 month extension of time fee and on account of the additional claim fees.

The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service on the date indicated below as first class mail in an envelope addressed to the Commissioner of Patents, Washington, D.C. 20231.

Date: 5/10/02

Signature: Carolina Rodriguez
Person Making Deposit

Application No. 09/249,216

Marked Up Specification Replacement Paragraph(s)

Page 1, line 1 is amended as shown below.

[POWER CONTROL METHOD] <u>POWER CONTROL METHOD BASED AT LEAST PARTLY OF SPREAD SPECTRUM TECHNIQUE</u>

Page 31, lines 1-13 are amended as shown below.

Abstract

In connection with the determination the transmit power of a beginning transmission there is also determined, in the method according to the invention, suitable output powers for other transmissions, so that the entity formed by all controlled transmissions is as close to the optimum as possible already at the beginning of a new frame. The method according to the invention takes into consideration the effect of a beginning transmission on other transmissions. The method according to the invention further takes into consideration changes in the conditions during the previous frame by including the control history of the fast power control as initial information of the calculation made during the re-determination of the output powers, for instance as a suitable statistical quantity of the transmission history of each transmission, for instance as an average over a certain period.
[Figure 2]

Marked Up Claim(s)

1. (Amended) A power control method [system] in a mobile system based at least partly on a [the] spread spectrum technique and having at least one mobile station and at least one base station, characterised in that the transmit power of more than one bearer is determined at a time with the aid of the method, and that the method comprises steps, in which

- a control function is formed at least partly on the basis of a quantity which at least partly represents the fast fading experienced by at least one bearer, and

- the control function is calculated in order to determine new output power values of said more than one bearer.

12. (Amended) A method according to claim 19 [11] characterised in that it further comprises a step, in which at least one element value is set to zero, when the value of said element is below a certain predetermined limit.

16. (Amended) An element of a mobile system, characterised in that it comprises

- means to generate a quantity which at least partly depends on the fast fading experienced by at least one bearer,

- means to determine [of] the output power values for more than one bearer at least partly on the basis of said quantity, and

- means to control the output power of at least one bearer on the basis of said output power values.